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U. S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE
CALIFORNIA FOREST AND RANGE EXPERIMENT STATION
Division of Forest Insect Research

DOUGLAS-FIR BEETLE
SIX RIVERS, KLAMATH, AND SHASTA-TRINITY NATIONAL FORESTS
SUMMER 1955
APPRAISAL SURVEY

Introduction

An epidemic infestation of the Douglas-fir beetle, Dendroctonus pseudotsugae Hopk., has been under way in the northwestern part of the State for the past several years. According to the 1954 survey report,1/ the following areas are most heavily affected:

1. South Fork of the Trinity River;
2. Madden, Grouse and Mosquito Creeks;
3. Major drainages of the Klamath River from Blue Creek north to Grider Creek.

Tree killing has occurred generally throughout the range of high-site, pure or nearly pure stands of virgin Douglas-fir, of which much of the above three areas are composed. According to the 1954 report, the areas of heavy group-killing (excluding scattered loss) amounted to some 200,000 acres. The 1955 aerial reconnaissance 2/ indicated that the overall area of infestation did not change appreciably this year, and only in the South Fork of the Trinity was there any noticeable increase in the number of groups.

In order to obtain more information on whether or not epidemic conditions were continuing or decreasing, a ground appraisal survey over the entire area was conducted by personnel of the Division of Forest Insect Research during the period August 15-28, 1955. This report summarizes the information gathered on the survey.

Methods

As in 1954, groups of insect-killed trees were selected along existing roads throughout the infestation area. Each tree within a group was examined for the presence or absence of brood, as were the surrounding green trees. All trees, infested and abandoned, were measured to the nearest 2 inches d.b.h. Many newly attacked trees at this time of year give no indication of attack except for the presence of minute piles of reddish frass in the bark crevices, visible only on close examination. Abandoned trees have loose bark and generally show signs of the white frass made by termites and ambrosia beetles working in the sapwood. Figure 1 shows sample points.

1/ Hall, R. C., Eaton, C. B., and Downing, G. L. Douglas-fir Beetle, Six Rivers and Klamath National Forests, July 1954. Reconnaissance Survey, C.F.& R.E.S., Berkeley, Calif., Aug. 6, 1954.

2/ Trostle, G. C. Douglas-fir Beetle, Klamath, Shasta-Trinity, and Six Rivers National Forests, Spring 1955. Appraisal Surveys, C.F.& R.E.S., Berkeley, Calif., Aug. 19, 1955.

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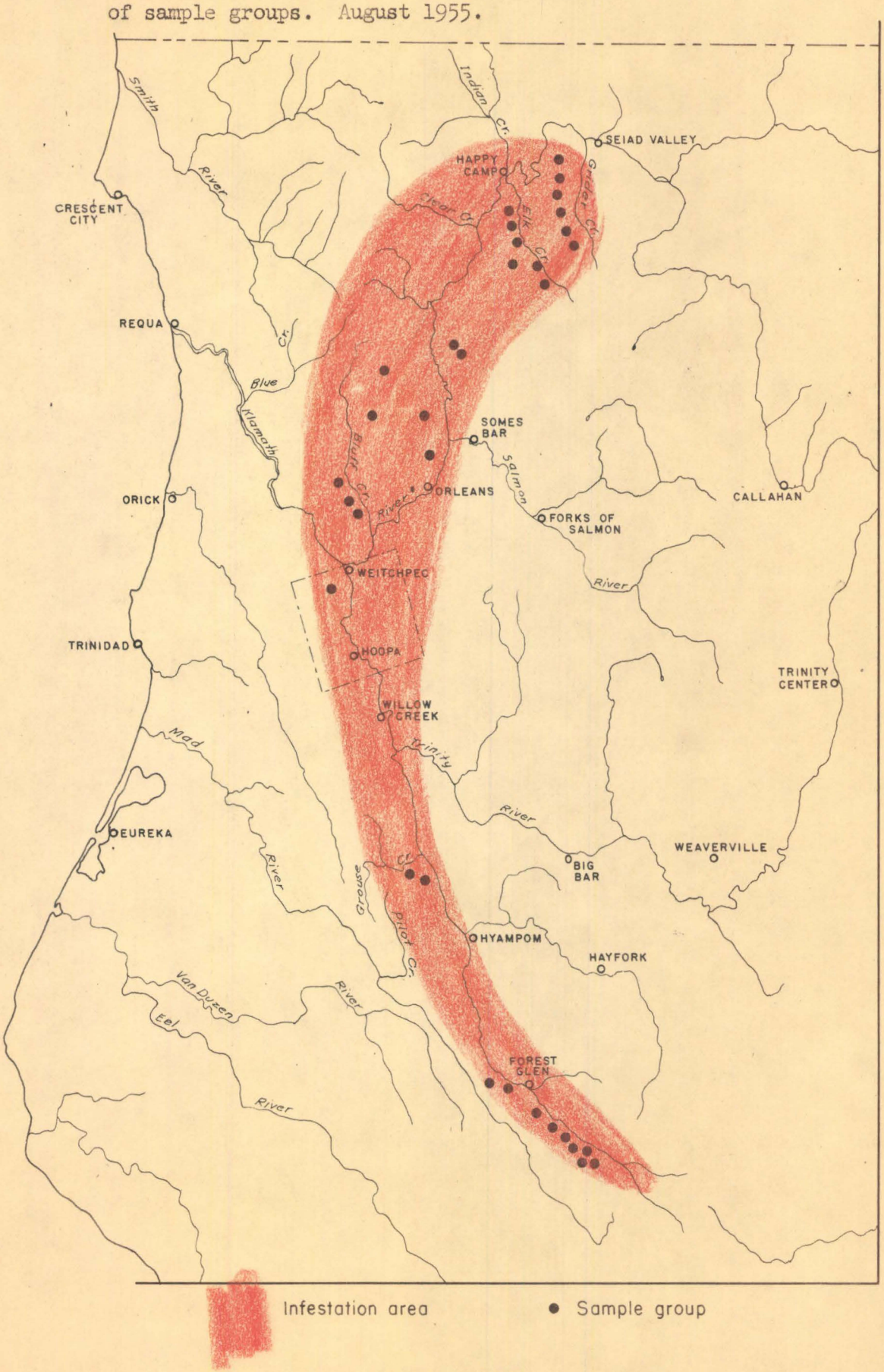
Fig. 1. Generalized Douglas-fir beetle infestation area and location of sample groups. August 1955.



The trees checked were listed as:

1. Abandoned, no needles (1952, 1953, and early 1954 loss);
2. Abandoned, red needles (1954 loss)
3. Infested, fading (1955 loss)
4. Infested, green (1955 loss)

Although it is difficult to date mortality in Douglas-fir beetle-killed trees, about one-half the "abandoned, no needles" group are thought to be early 1954 loss, and are included in the calculations in that category.

Groups containing only old abandoned trees (1952 or 1953 kills) exclusively were not included in the survey data, for if there is no current activity there is nothing upon which to base an estimate of the trend of the infestation. Many of these completely abandoned groups occur throughout the forest. Some groups composed of all new trees also are present and undoubtedly were not spotted in the course of the survey. On the basis of the extensive observations made, these are thought to be in the minority.

In order to watch crown fading and deterioration in the future as an aid to estimating the year of tree death, several groups on the Elk Creek, Grider Ridge and Fisher Logging Road were marked with aluminum paint. These groups contain trees that were infested, either fading or green, at the time of marking. An "X" painted on the butt indicates that the tree was beginning to fade, and an "O" indicates that the tree was green.

Results

Throughout the infestation area, 33 separate groups containing a total of 372 trees killed by the Douglas-fir beetle in 1954 and 1955 were examined. Of this total, 328 trees were classed as 1954 kill, and 44 as currently infested or 1955 kill. This gives a ratio of recently killed to currently infested trees of more than 7 to 1. (See Table 1)

In the vicinity of Happy Camp, 12 groups totaling 143 trees were checked. Of these, 121 were 1954 kills and the remainder 1955 kills. These groups were chosen in the China and Elk Creek drainages, two of the more heavily hit spots. Clear Creek was not sampled; however, it is probable that similar conditions are prevalent there also. The Indian Creek drainage is relatively free of beetles. Two groups were examined in the vicinity of the Tea Bar sale area, but no currently infested trees were found.

In the Orleans-Hoopa region, 8 sample groups contained 37 1954 kills and only one 1955 tree. While this is a very small sample, it bears out general observations made throughout the summer in this area that a sharp reduction in activity has occurred. The headwaters of Bluff and Blue Creeks were not surveyed, but from aerial observations earlier in the year it is supposed that the character of the infestation there is similar to that in the Elk and China Creek drainages farther north.

Table 1.--Volume[1/] and number of dead trees in Douglas-fir beetle-infested groups sampled, Six Rivers, Shasta-Trinity, and Klamath National Forests--August 1955

Area	Route and group number		1954 (Abandoned)		1955 (Infested)		Total	
			Number	Volume (b.f.)	Number	Volume (b.f.)	Number	Volume (b.f.)
Orleans	Bluff Cr. Rd.	1	8	24,520	1	2,720	9	27,240
		2	3	7,500			3	7,500
		3	6	13,000			6	13,000
	Cedar Camp Rd.	1	2	10,330			2	10,330
	Barkshanty Rd.	1	3	17,830			3	17,830
		2	5	13,290			5	13,290
		3	4	13,460			4	13,460
	Subtotal	7	31	99,930	1	2,720	32	102,650
Happy Camp	Ukonom Rd.	1	13	42,200			13	42,200
		2	9	25,000			9	25,000
	Grider Rdge.Rd.	1	4	25,480	1	1,510	5	26,990
		2	6	5,095	1	4,440	7	9,535
		3	39	27,370	2	1,110	41	28,480
		4	10	38,590	4	4,390	14	42,980
		5	9	30,770	4	9,940	13	40,710
		6	7	11,390	2	2,700	9	14,090
	Elk Creek Rd.	1	4	2,090	3	6,300	7	8,390
		2	11	9,960			11	9,960
		3	10	6,300	2	840	12	7,140
		4	3	4,855	4	6,440	7	11,295
		5	12	23,595	2	3,650	14	27,245
	Twin-Malone Rd.	1	6	8,060			1	8,060
	Subtotal	14	143	260,755	25	41,320	163	302,075

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(Table 1, Continued)

Area	Route and group number		1954 (Abandoned)		1955 (Infested)		Total	
			Number	Volume (b.f.)	Number	Volume (b.f.)	Number	Volume (b.f.)
Hoopa	Bald Hills Rd.	1	6	14,000			6	14,000
	Subtotal	1	6	14,000			6	14,000
South Fork Trinity	Highway 36	1	17	15,535	2	2,170	19	17,705
		2	25	20,960	1	500	26	21,460
	Fisher Log Rd.	1	1	2,060	3	9,780	4	11,840
		2			2	7,940	2	7,940
		3	30	86,680	3	10,450	33	97,130
		4	4	8,650			4	8,650
		5	1	2,720	3	11,080	4	13,800
		6	4	19,670			4	19,670
		7	22	123,390			22	123,390
	Subtotal	9	104	279,665	14	41,920	118	321,585
Grouse Creek	P.G.& E. Rd.	1	23	36,180	3	1,960	25	38,140
		2	19	38,550	1	2,720	20	41,270
	Subtotal	2	42	74,730	4	4,680	45	79,410
Totals		33	328	729,080	44	90,640	372	819,720
Average volume per tree				2,223		2,060		2,203
Average			10	21,444	3	5,035	11	24,108
Percent of total			88		12		100	

1/ Volumes gross from Hornibrook's Table 3 -- Site 1 and 1A.

156

Only two samples were taken from the Grouse Creek area, totaling 46 trees. Four of these trees were infested. The percentage of infestation throughout this drainage and the Mosquito and Madden Creek drainages is probably somewhat higher than the sample would tend to indicate, although not alarmingly so. In the South Fork of the Trinity River area, 9 groups checked yielded 104 1954 kills and 14 1955 kills. This region, both from the air last spring and from ground observations in the summer, appeared also to be among the heaviest hit.

It is probable that the ratio of 1954 to 1955 loss, more than 7 to 1 as found in this survey, is a bit more optimistic than is actually the case. However, in 1954 Hall and Eaton, using the same survey technique, arrived at a 1 to 1 ratio; so proportionally there appears to be a marked reduction in the intensity of the infestation over the entire area.

A word about insect control benefits of logging, although not particularly a survey matter, might be worth mentioning. The Douglas-fir beetle has a 1-year life cycle, and the heavy flights occur in April and May. The emerging beetles prefer to attack down logs if they are available. Recent windthrows and trees felled in logging operations during the fall and spring will, under epidemic conditions, be attacked by as many as 8 pairs of beetles per square foot of bark surface. Windthrows produce heavy broods, but the mechanical damage and drying common to cut logs somewhat reduces brood production; in either case large numbers of new adult beetles are absorbed. Timing of cutting so as to have attractive material on the ground when the beetles fly, and then logging before the following spring, can undoubtedly do a considerable amount of good toward reducing Douglas-fir beetle populations in the surrounding forest area.

Discussion and Recommendations

Infestations of the Douglas-fir beetle in the Pacific Coast region are charastically short-lived,3/many having come and gone in the past even without the knowledge of the timber owner. Groups of old snags within the virgin timber, showing no sign of fire, bear witness to the fact. Now, as forest management in the Douglas-fir region progresses, continually improved access road nets will aid detection and thence recovery of insect-killed timber.

On the basis of the survey and knowledge of the course of past infestations, it appears probable that, barring some unforeseen development, the current activity will decline within the next year. Some group-killing, particularly in the China and Elk Creek areas near Happy Camp and in the South Fork of the Trinity, will undoubtedly persist for a slightly longer period. Continued surveillance is necessary. The aggressive program of making timber sales in areas of heavy concentration of losses should be continued in order to obtain maximum utilization of the timber killed by the Douglas-fir beetle.

3/ Bedard, W. D. The Douglas-fir Beetle. U. S. Dept. Agr. Cir. 817, April 1950.

Berkeley, California
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